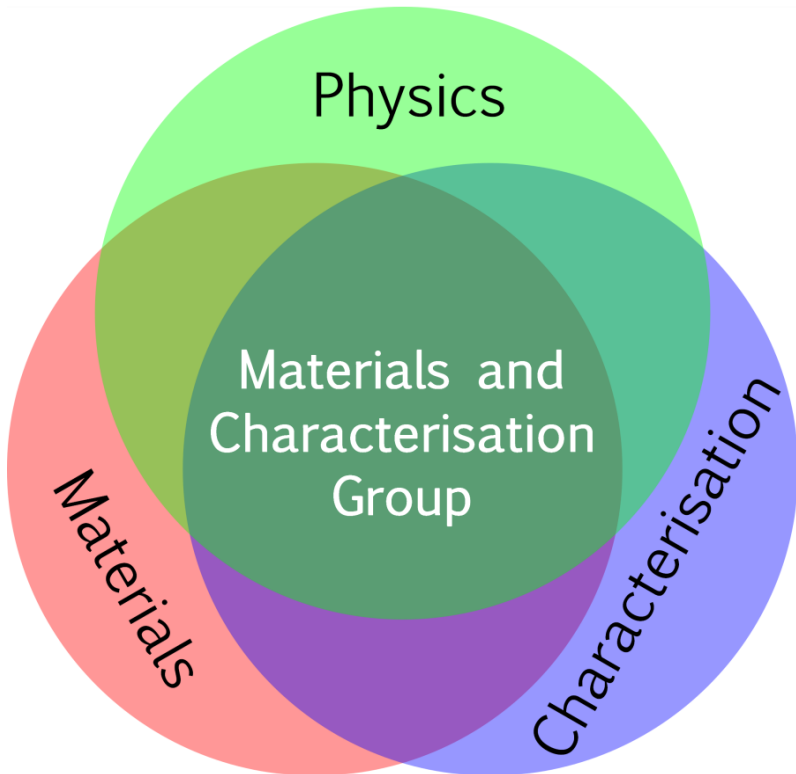

IOP

Institute of Physics
Materials and
Characterisation Group

NEWSLETTER**October 2013****Issue no. 19**

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From the Editor

Welcome to the Materials and Characterisation Group newsletter for October 2013. We haven't had a newsletter for some time, so we're using this opportunity to reintroduce the group and the group committee, and to report on the recent conferences we have organised or supported. You'll also find details of how you can get involved in our activities, by applying for funding for your own conferences, for research student funding, or by suggesting topics for future events. We're looking forward to hearing your suggestions; do get in touch via the contact details on the back page.

In future we intend to send a brief update with advance details of our 2014 conferences in January, followed by a full newsletter with reports on our activities in September. In the meantime if you have any comments, or suggestions for content or features, please feel free to drop me a line at c.dancer@warwick.ac.uk

Claire Dancer
Newsletter Editor

This newsletter is also available on the web and in larger print sizes: see <http://mc.iop.org>

The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated.

The Institute of Physics, 76 Portland Place, W1B 1NT, UK.
Tel: 020 7470 4800 Fax: 020 7470 4848

Chair's report

Dear Colleagues

As Claire stated, it has been a while since our last newsletter. Several long standing members of the committee have left over the past couple of years resulting in quite a change in the committee membership and so we are reintroducing ourselves. The changes have also given rise to discussions of our purpose; our thoughts have been encapsulated in a poster put together by Dr Sarah Fearn which will be available on the Group's website. We hope the poster will also be displayed at the events the Group organises or supports. Your views are welcome.

Once again the Group has supported several national and international conferences and workshops this year, all well attended. The reports of these events are given later in the newsletter. As ever, the committee can facilitate IOP help and sponsorship of meetings organised by other organisations that we believe would be of interest to you, as well as those we organise ourselves. We are therefore always keen to hear suggestions for meeting themes, or of events of potential interest, so please feel free to contact me with your ideas. Future events we have already committed support to can be found on our group calendar.

Also in this newsletter: The funding and career environment remains challenging for many and we are keen to highlight the benefits of IOP membership and encourage the utilisation of the resources it offers. This newsletter highlights two such activities; the hopefully well-known student bursaries that contribute towards the costs of attending conferences or meetings (for those students who apply!). This year we received nine applications and were able to recommend support for all the applicants. A necessity of the award is the writing of a report about the meeting by the student, two such examples are given later. We also have an article by Stephanie Richardson, who is the Head of Membership Development, outlining the range of professional development opportunities the IOP offers (in addition to the provision of meetings and conferences). There are several such benefits the IOP offers which can be easily overlooked, we hope to rectify that in future newsletters, alternatively reacquaint yourself with the IOP by visiting its website.

We hope you find the following of interest and we are always keen to receive your feedback so we can improve what we can do for you.

Best wishes

Jon

About the Materials and Characterisation Group

The Materials and Characterisation Group has a relatively large membership drawn from a wide range of interests, both industrial and academic, with an appreciable number of overseas members. Group membership currently stands at 633. Of these:

- 152 are from Academia, 62 from industry and 48 are students (419 unknown)
- 516 are UK based and 114 are non-UK based (3 unknown).
- 104 are female and 501 are male (28 unknown)

New members are always very welcome!

Many members of the Group are engaged in technologies and engineering of various kinds, and there is sometimes interest in discussion of the basic physics of new (or even old!) processes, techniques and materials. On the other hand, some members engaged on theoretical aspects of a subject welcome expositions of empirical techniques.

Such a diverse spread of interests and considerable overlap with other Groups and outside bodies means that the Committee has to pay great attention to planning meetings. The style of meetings varies widely and major meetings are usually organized in co-operation with other Groups and outside bodies. Of particular interest are our review meetings which cover the principles and applications of various techniques, such as thermal imaging, spectroscopic techniques, electromagnetic and magnetic methods of NDT, ultrasonics, etc. These meetings are particularly useful for members new to a field, or engaged in related fields. Another popular type of meeting is where the latest ideas and advances in a particular field are reported and discussed. Meetings are announced via email and an up-to-date list is kept on the Calendar page of the group website.

The Committee always welcomes suggestions for meetings and meeting topics of interest to Group members. If you have any ideas for a meeting or wish to be involved in organising a meeting with the Group, please contact one of the committee members using the contact details on the back cover of this magazine, or see our group website <http://mc.iop.org>

Profiles of the Group Committee

Chair - Dr Jonathan Painter (Dept. of Engineering and Applied Science, Cranfield University) runs the microscopy laboratories at Cranfield University after completing a PhD in photovoltaic thin film characterisation. He works extensively with industry on material and failure analysis investigations. His research interests lie largely in the applications of electron microscopy, including thin film characterisation, high strain rate testing and gunshot residue (or firearms discharge residues) analysis.

Secretary - Dr Richard Morris holds a Research Fellowship within the **Physics Department at the University of Warwick**. He obtained his PhD in semiconductor physics developing and integrating strained germanium layers with silicon to enhance the hole mobility for future microelectronic technologies. His current research involves the analytical technique secondary ion mass spectrometry (SIMS) with particular emphasis on the development of ultra-low-energy SIMS (uleSIMS) for nanoscale material analysis. This has included materials as diverse as pure germanium layers in silicon, III-V heterostructures and quantum wells, nitrides (GaN, GaNSb, InN), nanowire arrays, self assembled monolayers (SAMs) and superficial core shell nanoparticles. He has published over 50 papers in international journals.

Treasurer - Dr Alison Crossley is the manager of **Oxford Materials Characterisation Services (BegbrokeNano) at the University of Oxford** and along with her team provides expertise to industry and other research groups. Alison is a recognised expert in the characterisation of surfaces with over 100 peer reviewed papers. Alison's research interests are wide and varied but all apply the common theme of using characterisation as a tool to understand how materials interact with their environment. Alison gained her first degree in Chemistry at Liverpool University and subsequently a Ph.D. in surface science under the supervision of Professor Sir David King.

Dr Giles Aldrich-Smith has worked at **AWE** for nearly 6 years after holding previous positions at the National Physical Laboratory and BAE Systems. He has research interests in instrumented indentation, high strain rate mechanical testing, and the effects of ageing on the mechanical performance and microstructure of metals. Dr Aldrich-Smith is currently leading a team of scientists responsible for the development and characterisation of materials used in micro-scale targets for laser-driven Plasma Physics experiments.

Dr Claire Dancer is a recently appointed Assistant Professor in Nanocomposites at **Warwick Manufacturing Group, University of Warwick**. She gained her DPhil at the University of Oxford on the superconducting material magnesium diboride, remaining at Oxford for her postdoctoral work on ceramic materials for armour applications and on electromagnetic materials. Her current research is on

developing new methods for producing functional nanocomposite materials based on polymer and ceramic matrices for application in electromagnetic devices.

Dr Sarah Fearn is a research officer in the surface analysis lab in the **Department of Materials at Imperial College**. She has been at Imperial College since finishing her PhD where she first started using SIMS to investigate low energy implants in silicon. After two years of working in commercial SIMS analysis, she returned to academia to undertake research on the corrosion of the ancient glasses. More recently she has been responsible for the management of the new ToF-SIMS LEIS facility at Imperial. Along with carrying out research, her other roles consist of training and assisting researchers using the instrumentation and develop methodologies for the analysis of new materials.

Dr Hamid Kheyrandish is currently the director of **Aystorm Scientific Ltd** which provides consultancy and analytical services and a graduate of the University of Manchester (Physics) and has a PhD (also in Physics) from the University of Salford. He spent a number of years at Salford perusing his research interests in the areas of ion interactions with solids, ion assisted deposition and various characterisation techniques. He has also held Visiting Professorships at the Universities of Strathclyde and Manchester Metropolitan. Hamid founded MATS (UK) Ltd, a company providing a commercial surface analysis service specialising in SIMS. Hamid is the co-author of over 100 published scientific papers.

Dr Claire Leppard has worked at **AWE** for 14 years since graduating in Applied Science with a PhD from Coventry University in 'Mathematical Modelling of Some Mechanical Properties of Construction Materials'. She has held both technical and managerial roles at AWE within team of specialist scientists who measure the mechanical properties of polymer bonder explosives (PBX). This has led to an enhanced understanding in the deformation response of PBX composites to applied stress and generated numerous publications in describing the mechanical properties damage evaluation, ageing and modelling of PBX. Dr Leppard is currently the Technical Assistant to the AWE Director of Science, Technology & Production Operations.

Dr David McPhail is a Reader in Surface Analysis at **Imperial College** and manager of their surface analysis facility. His research interests include the surfaces of materials and how they interact with their environment. He uses techniques such as SIMS to study surface phenomenon such as corrosion, oxidation, diffusion and segregation. He is also studying the factors that determine the resolution in the SIMS process, which can be below one nanometre in favourable cases. Other work involves the use of stable isotopes to determine oxidation kinetics and mechanisms for aerospace alloys and corrosion rates in float glass. He collaborates with museum conservators on several projects including laser cleaning, albumen photographs and anoxic barrier films.

Professor Hari Reehal is Professor and Head of the Energy, Materials and Sustainability group in the **Department of Engineering and Design at London South Bank University**. He was a lecturer in Physics at the University of Bradford from 1978 to 1985 where his research was focussed on thin film electroluminescent materials and devices. From 1985 to 1993, he was Team Leader of the Solid State and Surface Science Groups at BP Research, Sunbury, leading a wide range of projects in photovoltaics (PV), surface science and coatings. PV research and development included wafer crystalline silicon, thin film GaAs and thin film silicon. He joined London South Bank University in 1993 as a BP sponsored Reader and was promoted to Professor in 2000. His current research is focussed on the growth, processing and characterisation of thin film materials for PV devices. The main emphasis is on thin film crystalline silicon including novel concepts such as nanowire, plasmonic and heterojunction solar cells. Related work includes passivating and anti-reflecting coatings and transparent conducting oxides, particularly ZnO.

Dr Annela Seddon is the Graduate Teaching and Research Fellow for the **Bristol Centre for Functional Nanomaterials based in the School of Physics at the University of Bristol**. Before taking up this position in 2009, she completed a PhD in Biomaterials at the University of Bristol with Professor Stephen Mann FRS. After this, she undertook a postdoctoral position in the School of Medical Sciences at the University of Bristol with Professor Paula Booth before being awarded an EPSRC Life Sciences Interface Fellowship held jointly between Imperial College and the University of Chicago. Since returning to Bristol, her research interests have focused on self-assembly and structural analysis of biological materials on the nanoscale using x-ray scattering techniques, development of microfluidic technologies for x-ray scattering and more recently collaborations with Aerospace Engineering into adaptive camouflage for military applications. She has recently become Editor of the Journal of Materials Science.

Dr Melvin Vopson (formerly known as Marian Vopsaroiu) has been a Lecturer in Applied Physics at the **University of Portsmouth** since Oct. 2012. Melvin graduated his BSc (Hons) and MSc degrees in Physics from the University of Bucharest and received his PhD in Physics from the University of Central Lancashire in 2002. His previous appointments include two postdoctoral fellowships at the University of York, senior R&D scientist at Seagate Technology and over six years as Higher Research Scientist at the National Physical Laboratory. Currently his research interest revolves around experimental and theoretical studies of solid-state physics with emphasis on ordered and multifunctional systems. Melvin is also a Chartered Physicist and published over 40 articles in international journals. He has an h-index of 9 and has presented more than 25 invited, oral and poster contributions to international conferences.

IOP Membership: What Can the IOP Do For You?

By Stephanie Richardson, Head of Membership Development

With over 50,000 members the Institute of Physics has a fascinating and diverse membership that ranges from students, qualified professionals in all disciplines, to the still interested and involved retired community. More than 20% of members are from outside of the UK. The Membership Development team reflects this diversity in the range of activities with which it supports members.

The most popular of these is still Physics World- currently celebrating its 25th anniversary. It is available online, via Apple and Android apps as well as in hard copy. There's also an accompanying recruitment website www.brightrecruits.com All members also receive 50 free downloads from IOP journal titles and free access to peer reviewed business and management journals.

As members of the Materials and Characterisation Group you'll know about some of the Institute's networks and events but we also support a thriving local branch network undertaking outreach and public engagement work as well as programmes of events for the physics community. The IOP Business Forum is a programmes of round table events focusing on physics based industries. There's also a student network for both undergraduates and postgraduates and support for Physics Societies.

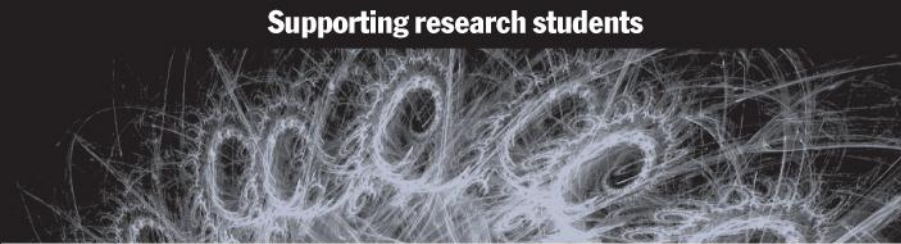
We also provide support for your career development, in whatever way suits you best. We offer 30 or so online transferable skills courses on topics ranging from ethics to project management; we have a member to member mentoring scheme; offer both the Chartered Physicist and Chartered Engineer qualifications and also provide careers information and resources for members in all kinds of careers and situations.

If you'd like to access any of the above do visit the members website (members.iop.org, email me if you have trouble logging in!) or if you have any questions or feedback about your membership I'd be delighted to hear from you! My email address is stephanie.richardson@iop.org

These articles are intended to inform/remind members of the group about the broader range of IOP activities and resources available beyond the group, and to let you know more about how you can access them. If there are any aspects of the IOP which you would like to see featured in this section in more depth, please let the newsletter editor know!

IOP Research Student Conference Fund

Student members can obtain funding from the IOP Materials and Characterisation Group to attend a meeting or conference. Each year we have several Research Student Conference Fund bursaries worth up to £250 to give away. The eligibility criteria and application form are available at <http://www.iop.org/about/grants/>



Supporting research students

Research Student Conference Fund

Providing financial support to research student members, to attend international conferences and major national meetings.

Apply for up to £250 during the course of your PhD.

Applications are considered on a quarterly basis and should reach the Institute by: 1 March, 1 June, 1 September or 1 December

For further information see www.iop.org or contact supportandgrants@iop.org

IOP Institute of Physics

If awarded a bursary, you will write a short report on your experience at the conference and these may be published in this group newsletter.

Over the next two pages you will find reports from two recent Research Student Conference Fund awardees.

International Workshop on Optical Terahertz Science and Technology , Kyoto, Japan

Report: Callum Docherty, University of Oxford

OTST is a biennial conference to promote and discuss the development and application of terahertz (THz) radiation produced by optical sources. Previously held only within the United States, this year the conference was held in Kyoto, but retained its international nature with over half of the attendees based at institutions outside of Japan.

The major focus of presentations in this conference was the generation and use of strong THz pulses. Rather than use THz as a low energy probe of optically excited effects, as in optical-pump THz-probe spectroscopy, strong THz pulses can be used to pump interesting phenomena in semiconductors themselves. This can be used to observe, for example, intra-excitonic effects in quantum wells.

Another key focus, and more relevant to my own studies, was the THz spectroscopy and THz applications of graphene. In common with many other areas of physics and materials research, the two-dimensional semi-metal graphene has generated intense research efforts from across the globe. Optical-pump THz-probe spectroscopy was used to investigate the dynamics of photoexcited carriers in graphene, and hot-carrier multiplication observed. It was noticeable that many groups have switched to studying chemical vapour deposition (CVD) graphene. This technique can produce large quantities of good quality graphene, and is the most likely candidate for production of future graphene devices. As such, it is not surprising that so many groups should now focus on CVD graphene, as opposed to epitaxial graphene that was previously the focus of THz investigations.

This conference allowed me to present my own work [1] on graphene to an international audience. It was useful and gratifying to hear positive feedback from many of those who heard my presentation. I was also able to discuss the similarities and differences between my own work and that of many other groups, and to understand more why there are differences in results – essentially that graphene is so sensitive to its surroundings that every sample is different. I was also able to hear about other applications of THz spectroscopy, and get to know some researchers from around the world.

Overall, the conference was a great success, and held in a beautiful city and just the right time to see the famous Japanese cherry blossom.

[1] Docherty, C. J. et al. Nat. Commun. 3:1228 doi: 10.1038/ncomms2235 (2012).

The Minerals, Metals and Materials Society Annual Meeting and Exhibition, San Antonio, Texas, USA

Report: Ying Chen, University of Southampton

Thanks to the support from the Materials and Characterisation by awarding a bursary of £250, I attended the TMS (The Minerals, Metals & Materials Society) 2013 Annual Meeting and Exhibition in San Antonio, Texas, USA, from 3rd to 7th March. This meeting contained over 60 parallel symposia which cover most of the topics in material science and engineering area. With over 4000 attendances from universities and industries, this meeting provided me a very good opportunity to get abundant information on the advanced progresses in researches and industries.

My research is on the subject of 'the relation between thermodynamics and high strain in an ultrafine-grained Al alloy'. I attended several relevant Symposiums. Many academic experts were invited to report their recent works. I was impressed by a keynote presentation given by Prof. Enrique Lavernia from University of California, Davis. The title was 'Advanced Materials and Processes for Extreme Environments'. He showed the background and the current advanced researches in the area of nanocrystalline metal. Afterwards, Prof. Yuntian Zhu showed the current researches in their group, titled: 'Grain Size Effect on Density of dislocations with Edge Components in Nanocrystalline Body-Centred Cubic Mo'. The TEM images in his PowerPoint were fantastic and beautiful.

I gave a 20 minute oral presentation on 5th March afternoon in the Symposium – Materials Processing Fundamentals: Metallurgy of Non-Ferrous Metals. My topic was 'Structural Modifications during Linear Heating of a Bulk Ultrafine-grained Al-Cu-Mg Alloy Produced by High-Pressure Torsion'. After my talk, the session chair, Antonie Allanore from Massachusetts Institute of Technology, asked me some interesting questions. During the conference, I tried to attend some relevant presentations in different symposiums. I walked around the poster sessions and talked with the students from other universities around the world. From my personal point of view, TMS Annual Meeting is really worth attending, with well-organized programs, nice atmosphere, great reputation and good food. I advise our IOP colleagues who will attend this conference in future to prepare your CV and business card before going. I am sure it will be a good opportunity to look for your future job and ask for collaboration.

The upcoming TMS event next year will be set in San Diego, California for February 16-20, 2014. The colleagues from IOP who want to attend it can find information at <http://www.tms.org/meetings/annual-14/AM14home.aspx>.

Reports on Conferences Supported by the Group

9th Photovoltaic Science Application and Technology (PVSAT-9) Conference, 10 – 12 April 2013, Swansea University

Report: J Ball and H S Reehal (London South Bank University)

The conference was organised by the Solar Energy Society, UK in collaboration with PV-Net, UK. Co-sponsors included the Materials and Characterisation Group of the IOP. PVSAT continues to be the premier annual event for the presentation and dissemination of research in photovoltaics in the UK. This year's conference was held at Swansea University from Wednesday 10th April to Friday 12th April. It was well attended with exactly 100 delegates of which 38 were registered as students. There were six exhibitor stands featuring the companies LOT Quantum Design, Horiba Scientific, Bentham Instruments, Pro-Lite, Wey Scientific and Ametek.

The opening session was chaired by the Conference Chair, Dr Tim Bruton and included a welcome address from Professor Ian Cluckie, Pro-Vice Chancellor at Swansea as well as Dame Mary Archer, President of the Solar Energy Society. The technical programme which followed was organised into 9 oral sessions containing 34 oral presentations which included 7 invited talks. There were 36 poster presentations delivered in 2 poster sessions.

A diverse range of PV topics were covered, from economic and business trends to solar cell materials and devices, modelling, fabrication and balance of systems equipment. With topics interspersed with one another a good overview of the UK PV research scene was presented. The invited talks reflected the diversity. Dr T Watson (Swansea) discussed the challenge of scale for hybrid organic/inorganic photovoltaics. PV industry price and technology trends were covered by Dr Paula Mints (USA) and Dr Steve Ransome described the status in measurement and modelling of PV systems performance. In an interesting talk, Dr S Glunz of the Fraunhofer ISE covered the subject of loss mechanisms in crystalline silicon solar cells and strategies for improvement. The resource implications of large scale PV deployment were discussed by Prof L Peter (Bath) and Dr Ian Forbes (Northumbria). Dr A Johnson (IQE) described the volume manufacture of multi-junction solar cells by MOCVD for space and terrestrial applications. The final invited talk was given by Dr D Lincot (IRDEP, France) on the interesting topic of electrodeposition and new architectures for CIGS solar cells.

The oral sessions continued with the presentation of a wide variety of interesting PV related topics. Dr Holliman (Bangor University) presented an interesting method of dye combination for dye sensitised solar cells. The chemical analysis

of CdTe solar cells by a glow discharge technique was compared to SIMS and EDS by Dr Kartopu (Glyndwr University). Economic analysis of the feed in tariff scheme was given by Ms Georgitsioti (Northumbria University). This analysis

focused on the lifetime and payback of domestic PV systems in twenty cities in the UK. Device structures were not ignored with Ms P Hardy (Leeds) presenting work on a nanocrystal activated Schottky barrier PV cell. This novel device incorporated layers of titanium, titanium dioxide and a noble metal. This was in turn replaced with CdS nanocrystals and silver nanowires.

There were many other high quality oral and poster presentations. Dr Tim Bruton, the conference chair, gave the closing address. The conference provided a good overview of UK PV research. It was followed by a technical tour of the SPECIFIC solar laboratories.

A welcome reception and dinner was held at Fulton House, Swansea University on the evening of the 10th April. This was followed by the main conference dinner and awards presentation on 11th April at the National Waterfront Museum in Swansea. The awards presented were as follows:

Best paper prize

P. Hardy, R. Mitchell, R. Jarrett, R. Douthwaite and R. Crook, University of Leeds, "Nanocrystal Activated Schottky Barrier PV Cell".

Best poster prize

D Wragg, K Ylemini, T Watson and D Worsley, SPECIFIC, University of Swansea, "Low power electrodeposition of platinum for dye sensitized solar cell counter electrodes "

Student best paper prize (supported by the IOP Materials and Characterisation Group)

C Pistolas, T Parel, L Danos and T Markvart, University of Southampton, "Experimental analysis of the angular distribution of emission from the edge of fluorescent collectors".

The 10th Photovoltaic Science, Applications and Technology Conference (PVSAT-10) will take place at Loughborough University in April 2014.

<http://www.pvsat.org.uk/>

If this conference report was of interest to you, please consider attending the next PVSAT in 2014. Details will be placed in the Materials and Characterisation Group Calendar on our group website (<http://mc.iop.org>) when available.

SIMS and Scattering Workshop Surrey University 17th April 2013

Report: Prof Roger Webb (Surrey University), Dr David McPhail (Imperial College) and Dr Sarah Fearn (Imperial College)

Sponsors: IOP Materials & Characterisation Group and IOP Ion and Plasma Surface Interactions Group

This event followed on from two one-day events held at Imperial College under the auspices of an EPSRC grant. A fourth meeting in this series is scheduled for 17th April 2014 at the IOP (see IOP events calendar).

The overall philosophy underpinning this series of one day meetings is to explore the application of ion beam based analysis techniques to the study of materials exploring the energy range from eV to MeV and looking at the information that can be gleaned from the various analytical signals. The speakers at this event were:

- Low Energy Ion Scattering - **Hidde Brongersma**, TU Eindhoven
- Medium Energy Ion Scattering - Installation of the MEIS system at Huddersfield, **Paul Baily**, Huddersfield University
- High Resolution RBS - **Ian Vickridge**, Universite Pierre et Marie Curie, Paris
- High Accuracy RBS - **Chris Jeynes**, Surrey
- LEIS & SIMS at Imperial – **Sarah Fearn**, Imperial College
- Atmospheric Pressure SIMS - **Brian Jones**, Surrey
- Other Atmospheric Pressure Mass Spectroscopy Techniques - **Ian Gilmore**, NPL
- Forensics Applications of SIMS and AP techniques - **Mel Bailey**, Surrey

If this conference report was of interest to you, please consider attending the next meeting in 2014 which will be supported by the IOP MC Group. Details will be placed in the Materials and Characterisation Group Calendar on our group website (<http://mc.iop.org>) when available.

Institute of Physics Singapore (IPS) Annual Conference Singapore 4-6th March 2013

Report: David McPhail (Imperial College)

Twelve UK delegates – Dr Martin Buzza (Hull), Prof Nigel Clarke (Sheffield), Dr Mike Cooke (Oxford Instruments), Dr Alison Crossley (Oxford), Dr Joseph Franklin (Imperial), Prof. Xiao Guo (UCL), Dr Tony Kenyon (UCL), Dr David McPhail (Imperial), Prof. Phil Moriarty (Nottingham), Dr Richard Morris (Warwick), Dr Annela Seddon (Bristol), Ms Giulia Tregnago (UCL) - were selected to attend the annual IPS workshop in Singapore in 2013. The selection process was designed to ensure that the members were at various stages in their career and from a broad range of universities and included one colleague from an industrial organisation (Oxford Instruments). All twelve delegates gave invited talks with Prof Phil Moriarty's talk one of the four keynotes

The workshop was held at the School of Mathematical and Physical Sciences at Nanyang University and the topical focus was nano-science and nanotechnology. A cohort from Southampton University was also in attendance for dedicated sessions on photonics so there was a strong UK presence. A high level of hospitality from the IPS included a tour of the facilities at IMRE and NUS on the Wednesday afternoon and a dinner on the Wednesday evening, which was hosted by the former Presidents Prof Andrew Wee and Prof Kwek Leong Chuan and the current IPS president Prof Chorng Haur Sow.

The overall aim of the visit was to build bridges both at the individual and institute level (IOP/IPS) to exchange ideas and expertise, and to catalyse further exchange visits, and this seems to have been achieved very effectively. The IPS was delighted that our delegation was able to attend and much goodwill was generated. Many contacts were made at the one-to-one level between Singaporean and UK delegates and also between UK and UK delegates!



Cultural evening at Raffles



Sixth form poster competition winners
with Mike Cooke

**Recent Advances in Nanoindentation –
Techniques and Applications
National Physical Laboratory 18th March 2013**

Report: Dr Giles Aldrich-Smith (AWE)

Nanoindentation instruments make highly localised and accurate measurements of mechanical properties such as hardness and elastic modulus by precise positioning of where the indentations are made. Over the last 25 years nanoindentation has become increasingly popular with an ever greater range of applications as the technique has developed and expanded.

A one day meeting on recent advances in nanoindentation was held at the National Physical Laboratory on the 18th March 2013. It was co-sponsored by the IoP Tribology Group and the Materials and Characterisation Group.

Around 40 delegates attended and heard presentations on a wide range of topics including indentation size effects, indentation creep, micro-mapping, fracture toughness measurement, micro-cantilever bending, nanomechanical testing of biomaterials and elevated temperature nanoindentation.

Recent and Forthcoming Conferences supported by the IOP Materials and Characterisation Group

Recent Events

- “International Symposium on Dynamic Deformation and Fracture of Advanced Materials” 9th-11th September 2013, Loughborough University
- “39th International Conference on Micro and Nano Engineering” – 16-19th September 2013, Imperial College, London.
<http://www.mne2013.org/>

Forthcoming Events

2013

- “High-speed imaging for dynamic testing of materials and structures” 18th-20th November 2013, Institute of Physics, London
<http://aptd.iopconfs.org>

2014

- “10th Photovoltaic Science, Applications and Technology Conference (PVSAT-10)” April 2014 (date to be announced) Loughborough University
<http://www.pvsat.org.uk/>
- “Ion Beam Analysis Techniques in Materials Science (from eV to MeV)” 17th April 2014, Institute of Physics, London
<https://www.eventsforce.net/iop/404/home>

For up-to-date details of these conferences and our current conference list, please check our group calendar at <http://mc.iop.org>

Group Committee Contact Details

Chair

Dr Jonathan Painter CPhys MInstP

Cranfield University
Shrivenham
Swindon
SN6 8LA

Tel: +44(0) 1793 785392 Fax: +44 (0)1793 783076

Email: j.d.painter@cranfield.ac.uk

Secretary

Dr Richard Morris MInstP
Research Fellow

University of Warwick
Department of Physics
Gibbet Hill Road
Coventry
CV4 7AL

Tel: (02476) 523871

Email: r.morris@warwick.ac.uk

Treasurer

Dr Alison Crossley MInstP
Manager Oxford Materials Characterisation Service

Department of Materials
Oxford University Begbroke Science Park
Begbroke Hill
Oxford
OX5 1PF

Tel: +44(0) 1865 283726

Fax: +44(0) 1865 848790

Email: alison.crossley@materials.ox.ac.uk